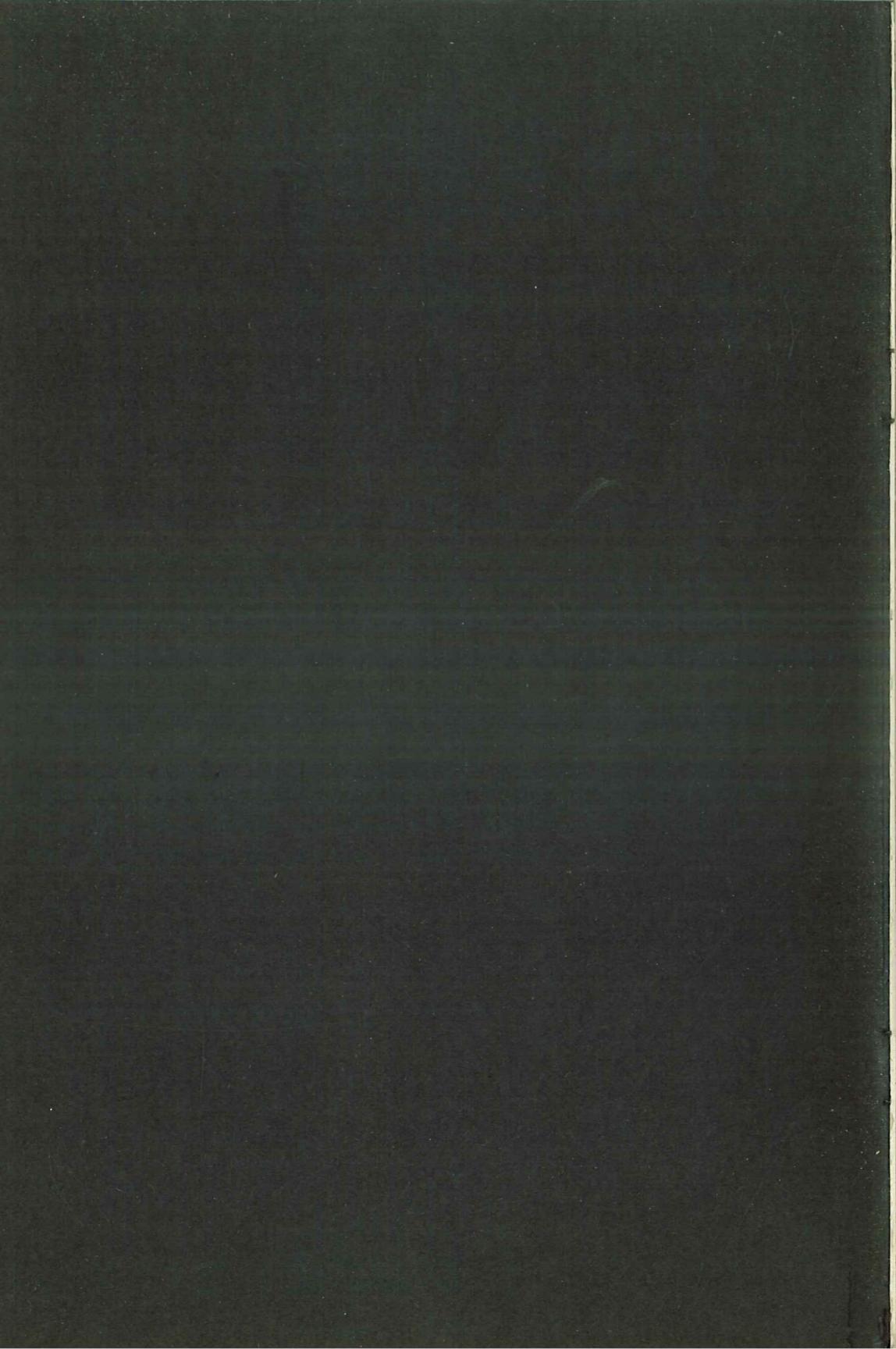




A Message
for the Operators of
KEWANEE BOILERS



KEWANEE BOILER COMPANY

Steel Heating Boilers, Tanks,
Garbage Burners and Radiators,
Power Boilers

MAIN OFFICE AND FACTORY

KEWANEE, ILL.

BRANCHES:
CHICAGO DETROIT
NEW YORK ATLANTA
ST. LOUIS LOS ANGELES
KANSAS CITY MILWAUKEE
MINNEAPOLIS PITTSBURGH
SALT LAKE CITY WASHINGTON

To you men who operate Heating Boilers:

You are all interested in a boiler which will burn any kind of fuel -- the kinds that may be obtained in peace times or war times.

The Kewanee Smokeless Firebox Boiler is the one that will do it and these are simple suggestions as to how to fire it. These suggestions are the result of years of study on our part and the experience of men like you, who have been operating boilers.

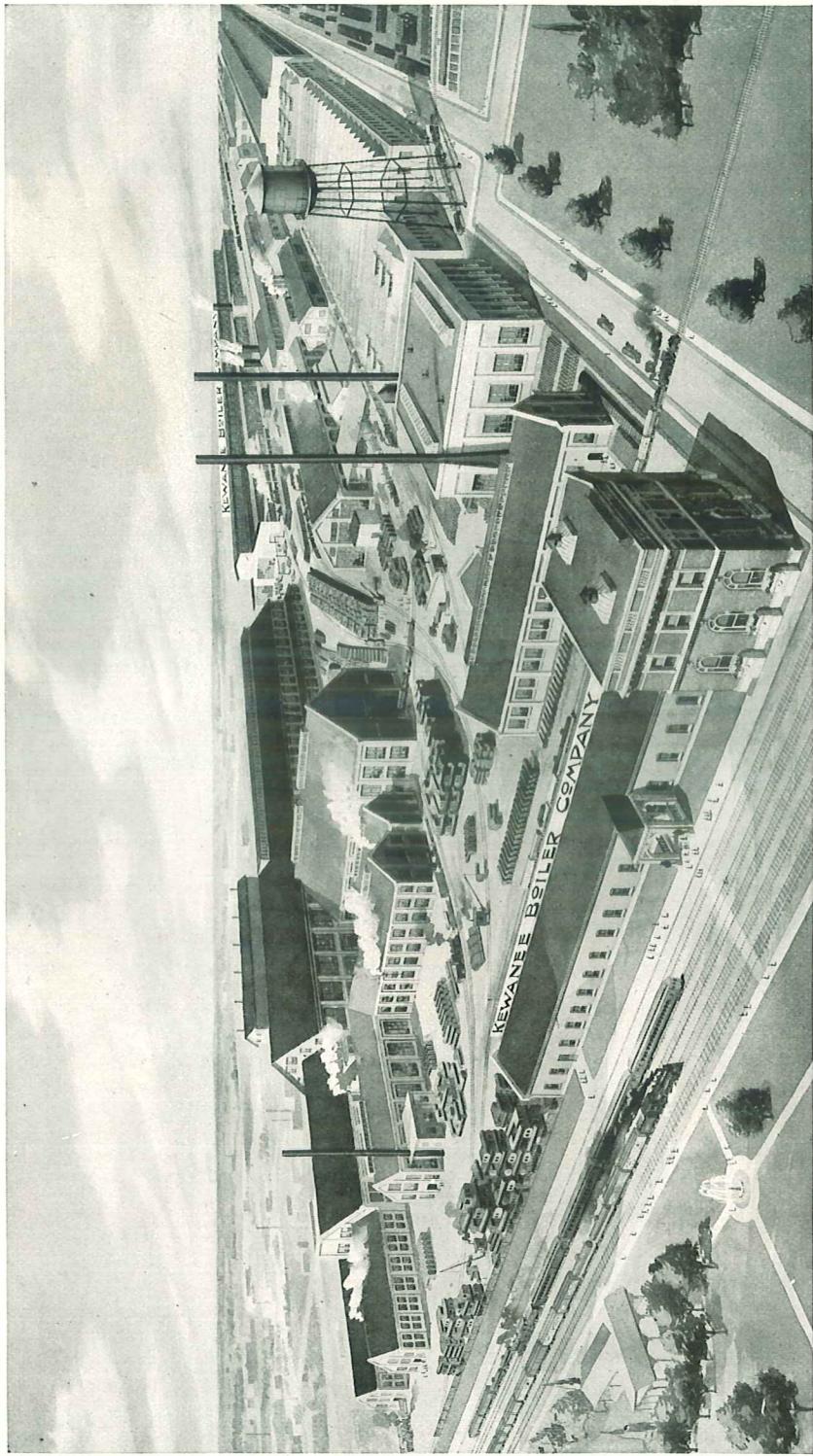
Yours very truly,

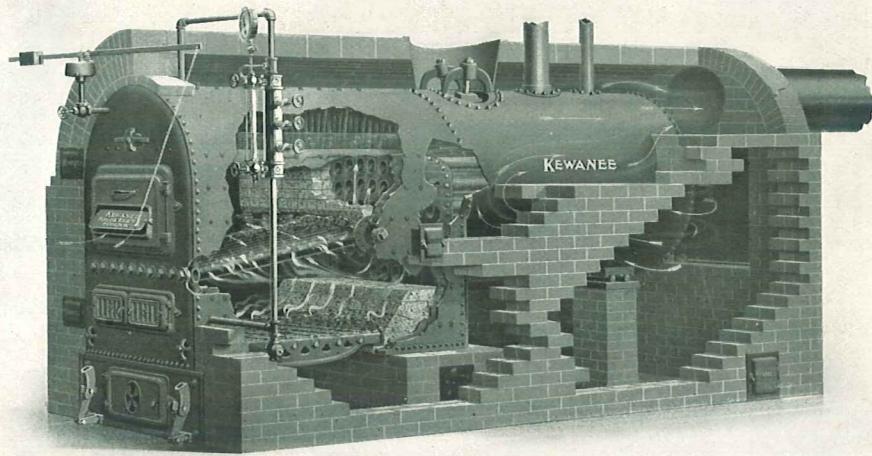
KEWANEE BOILER COMPANY.

Founded 1892

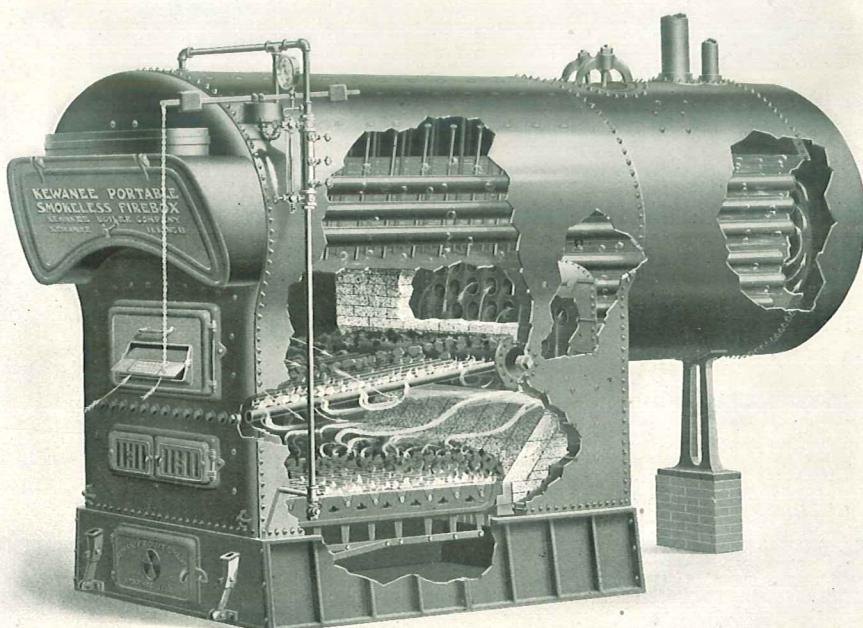
KEWANEE BOILER COMPANY

Works and General Offices





KEWANEE SMOKELESS BOILERS—*Brickset for Heating*



KEWANEE SMOKELESS BOILERS—*Portable for Heating*

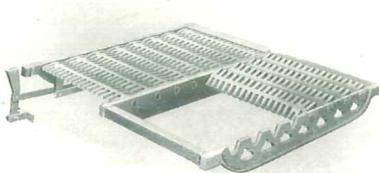
All Kewanee Boilers are Built of Steel

according to the rules of construction
adopted by the American Society of
Mechanical Engineers (known as the
A. S. M. E. Code)

The Century Rocking Grate

The Century rocking grate is furnished with all KEWANEE Boilers. It is made of the best selected iron, is heavy, strong, and durable, and has an air space of 55 percent, which renders it most efficient.

*Keep the top of these grate bars level and ash pit clean
to prevent warping and burning.*



This style of grate is furnished with boiler sizes 12, 112, 412, 312, and smaller. In those having a firebox longer than 38 inches, the front half of the grate operates independently of the rear half.

This two-section grate is furnished with boiler sizes 13 and larger; size 113 and larger in the brickset smokeless; size 413 and larger in the straight draft portable; and 313 and larger in the smokeless portable. Each section is operated independently.

See page 24 for illustration of parts of grates

Directions for Care and Operation of Kewanee Smokeless Firebox Boilers

- 1—Before a fire is started, fill the boiler with water so that the water line is four inches above the crown sheet or top plate of the firebox in the brickset type, and the same distance above the upper row of tubes in the portable type which should make the gauge glass about $\frac{1}{3}$ full.
- 2—See that the valves at the top and bottom of the water gauge glass are always open when operating.
- 3—You must always have the steam gauge cock open.
- 4—The try or pet-cocks on the water column are for testing the accuracy of the gauge glass. USE THEM.
- 5—Valves to the heating system, both the supply and the return MUST BE WIDE OPEN.
- 6—If the boiler is new, or the first time it is put in operation, change the water four or five times to wash the grease and oil out of the boiler, radiators, and pipes.
- 7—In the brickset boiler, all spaces between the boiler and the brickwork must be clear of false work, mortar, brick, and rubbish.
- 8—The breeching must fit tight in the boiler wall and chimney. See that it does not extend into the boiler brickwork or into the stack and cut off the draft.
- 9—Break up large lumps of coal. This is important.
- 10—Keep bed of coal even all over the grate.
- 11—See that there are no bare spots on grate.

- 12—Carry as heavy a bed of coal as draft will permit.
- 13—Do not fire on lower grates.
- 14—Fire on lower grate should not be more than three inches thick.
- 15—Air damper in ash pit door should be OPEN.
- 16—Keep middle doors closed.
- 17—Any accumulation of ash on lower grate should be spread.
- 18—Air for fire is admitted and regulated through upper or firing door and damper in it.
- 19—Never open middle doors except to clean fire on lower grate.
- 20—Do not carry more steam than is necessary to heat building.
- 21—The steam gauge cock must always be open.
- 22—Unnecessary pressure is waste of fuel.
- 23—Shift weights on regulator lever to change steam pressure.
- 24—Always use your poker diagonally under the top fire before supplying fresh fuel.
- 25—Ashes in ash pit will burn your grate bars. Keep ash pit clean.
- 26—Brush out fire tubes as often as is necessary to keep them clean.
- 27—Keep rear combustion chamber clear of all fly ash.

Suggestions for Firing Kewanee Smokeless Boilers

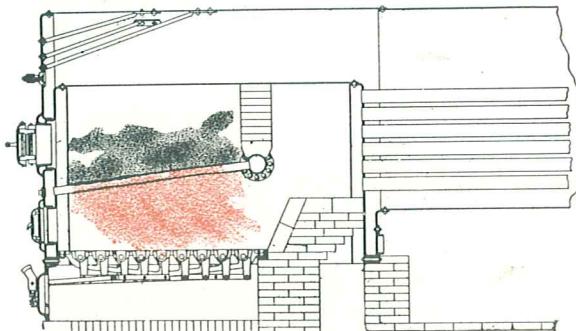


Fig. 1

Figure No. 1—Shows the method we advise in starting a cold boiler. The kindling should be placed on the upper grate. Put a small amount of coal on top of kindling then light kindling. When burning well, add more coal. The ash pit door and the middle door should be closed, and the draft door in the upper door left open.

Figure No. 2—As the burning progresses, spread coal on this kindling—the draft door at the top still remains open. It remains open because the regulator, if properly adjusted, holds it open, until steam is at the required pressure.

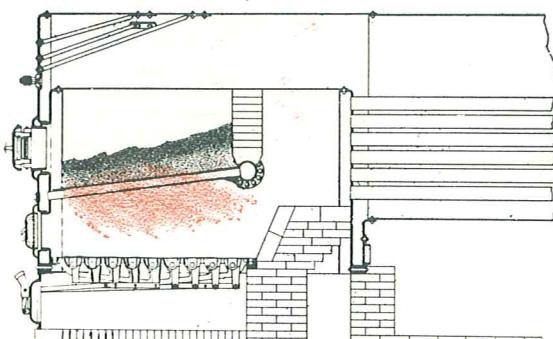


Fig. 2

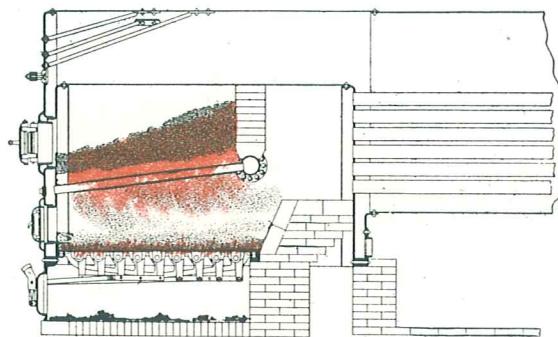


Fig. 3

Figure No. 3—Shows the entire fuel bed ignited. The kindling has burned out, steam pressure is up, and the regulator has closed the draft damper in the top door. There is nothing more to do to this fire until it is ready for the next supply of fuel. You will observe that the slight accumulation of fuel on the bottom grate, due to the starting of a cold boiler, has also ignited and is burning.

Figure No. 4—Shows the fire looking down on the upper grate after a period of 2, 3, 4, 5, or 6 hours, as the demand for steam may have been. It also shows slight holes in the fire. The poker shown, illustrates the method that we advise in preparing this fire for a fresh supply of coal. This is one poker and shows the angle at which to get under the fire on the top grate for the purpose of letting the ash accumulation drop to the lower grate. No matter what your furnace may be, the ash accumulation will always be found on the bottom of the fire.

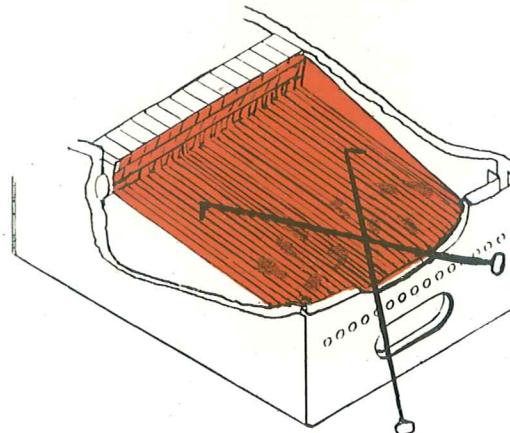


Fig. 4

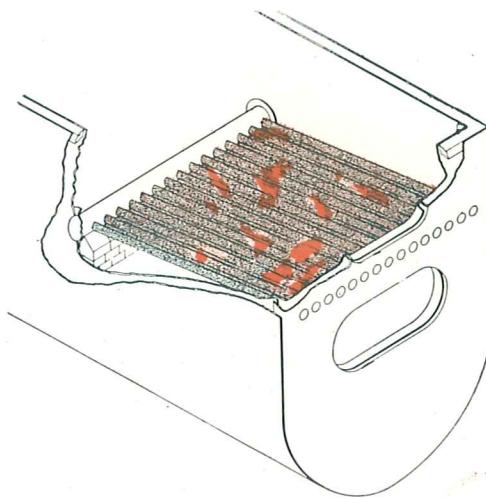


Fig. 5

Figure No. 5—Shows the boiler turned up-side-down looking at the bottom of the upper grate and shows the accumulation of ash on the bottom of the fire. The bright spots shown are holes in the fire, the light shining through from the fuel bed above. If these holes are allowed to remain as they are, cold air rushes through these holes and lowers the temperature of the boiler. A fire in this condition should never be replenished with coal until the poker has been used as shown in the previous figure.

Figure No. 6—In Figure No. 6 there is an accumulation of ash under the fire on the upper grate, and shows another view of the pokers going under this fire and the ash dropping to the bottom grate. The top poker shows the way we go into the door, and the poker is shoved along over the top of the grates back to the end of the grate.

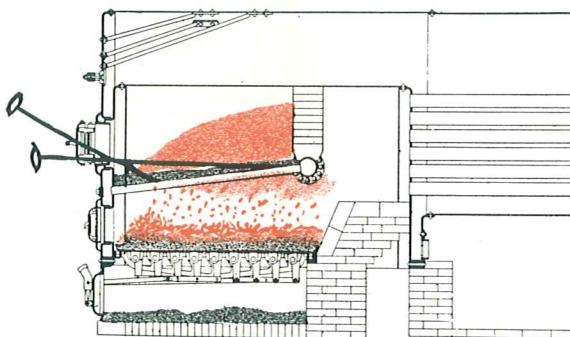


Fig. 6

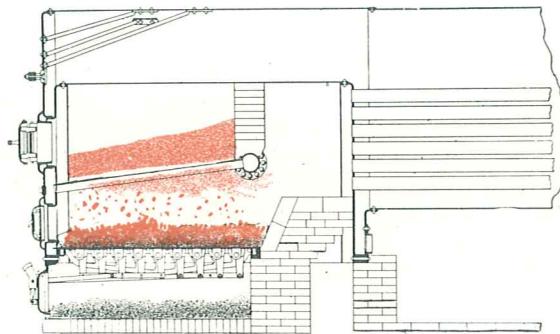


Fig. 7

Figure No. 7—Shows the operation of cleaning the fire completed, the fuel on the top grate in its proper condition to receive a fresh supply of fuel, and the ash and fuel on the bottom grate leveled. You will note that there is about 5 inches of fire at the front and 9 inches of fire at the back of this upper grate.

Figure No. 8—Is the fire shown on the previous figure but looking at the bottom with the boiler turned upside down. You will note that this fire is clean—no ash accumulations on the grate or holes in fire.

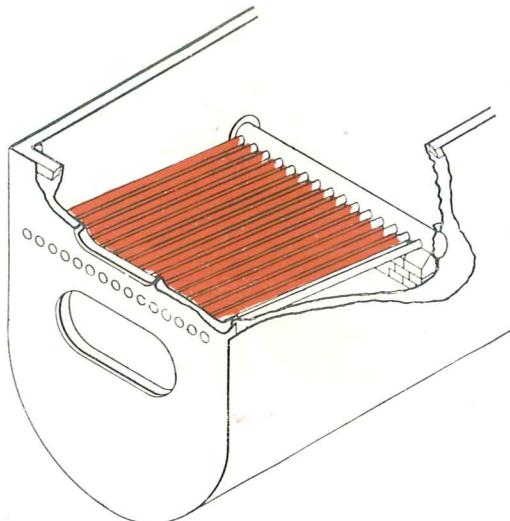


Fig. 8

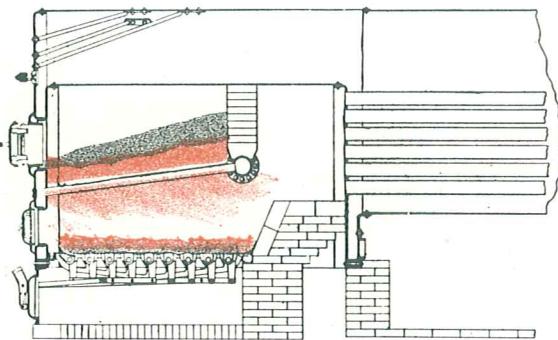


Fig. 9

Figure No. 9—Shows the same fire with fresh fuel added. Observe the thickness of the bed of burning coal and from 4 to 6 inches of green coal on the top. This fire is not smoking. The gases from the green coal pass through the hot fuel bed and are completely burned. On the bottom grate there is a slight accumulation of fire, due to the fact that the top grate had been cleaned by the poker operation. The greater portion of this is ash, and to burn the content of this lower grate, the bottom ash pit doors are provided with small circular openings which should be opened at this time to admit air for the burning of this fuel on the bottom grate.

Figure No. 10—Shows you the condition of the fire shown in Figure No. 9 after running a sufficient period of time to burn to this condition, and this length of time is controlled by the demand for steam to heat the building to its proper temperature and is regulated by the regulator. You will observe that the accumulation shown in the previous figure on the bottom grate is all burned up and is ash. You will observe that on the upper grate there is a dark line under the fire next to this grate. This is the accumulation of ash from the fuel of this fire.

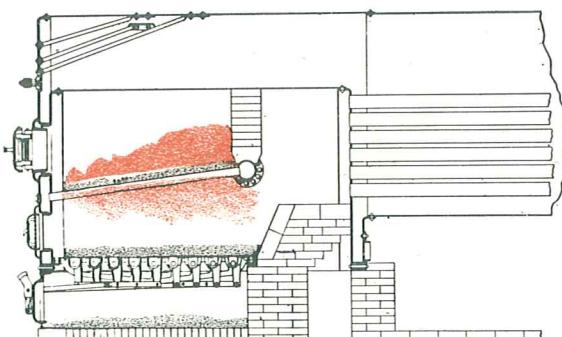


Fig. 10

When the condition of the fire is such that it will not make further steam, the poker should be used as previously shown, and then supplied with fresh fuel.

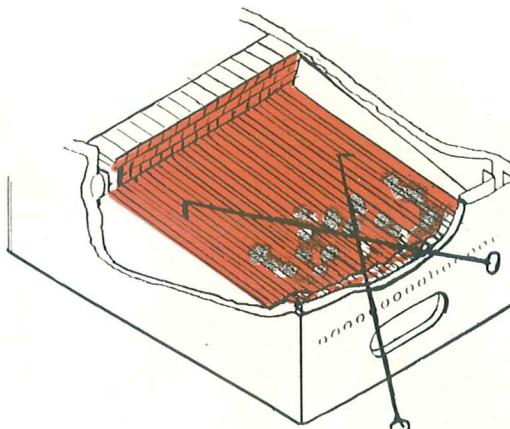


Fig. 11

Figure No. 11—Shows the appearance of the fire when it has arrived at the point when it will not produce more steam, due to the fact that holes are in the fire and cold air rushing through them is lowering the temperature of the combustion chamber. It again shows the method of using the poker in the fuel bed to clean out the ash from this grate. This operation will not extend over 3 minutes, and if done this way, your fire becomes level, your ash is cleaned out, you will have no clinkers, longer firing periods and your fire is ready for new fuel.

Figure No. 12—Again shows the manipulation of the pokers, two positions of the poker being shown. The lower illustration shows its position when it is extended the length of the furnace. Note the ash and a slight accumulation of fire is dropping down upon the lower grate. Also notice at the extreme front of the lower grate a slight pile of fire. This is due to running the poker through the top fire at this point. After the top fire has been cleaned of this ash, the accumulation on the lower grate should be leveled.

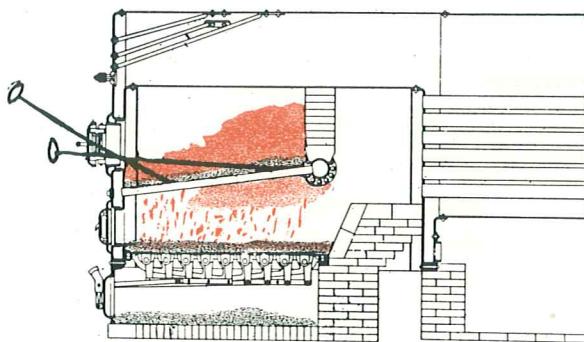


Fig. 12

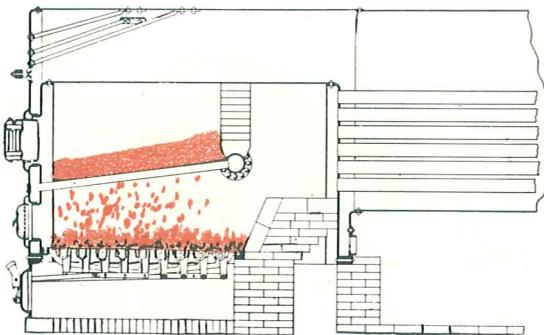


Fig. 13

Figure No. 13—Shows the condition of your fuel bed after using the pokers, illustrated in Figure No. 12. Again you will note that there is no ash on the top grate and practically none on the lower grate. A very slight shaking of the bottom grate relieves the lower grate of ash.

Figure No. 14—Shows the previous fire in Figure No. 13 replenished with fuel. It should always be fired in this manner, having the coal high in the back and tapering down to the front—never higher than the bottom of the door in front. In this manner you obtain long periods between firing, high efficiency and satisfactory operation. The bottom fire will always be burned down long before the top fire is ready to have fresh fuel, if the small circular doors in the ash pit are kept open.

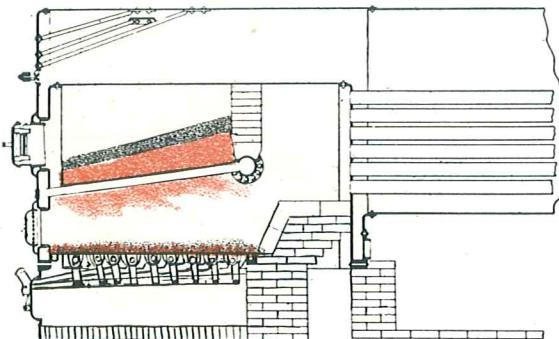


Fig. 14

What Not to Do

The previous figures show two complete cycles of operation of the down-draft furnace. The following figures show some common faults found in operating down-draft types of furnaces, and we are showing these to call your attention to the things that should not be done.

Figure No. 15—Shows a bad condition often found. The black portion on the upper grate is clinker and covers about two-thirds of the surface of the upper grate. Note that the improper use of the poker has forced a lot of fire down on the lower grate. The upper grate is so covered with ash that the gases cannot pass through. The heat of the fuel expands the gas and it filters out through the front door and causes further annoyance around the building. The accumulation on the bottom grate was not spread out over the entire grate, allowing cold air to get in all around the fuel and letting the fuel go out.

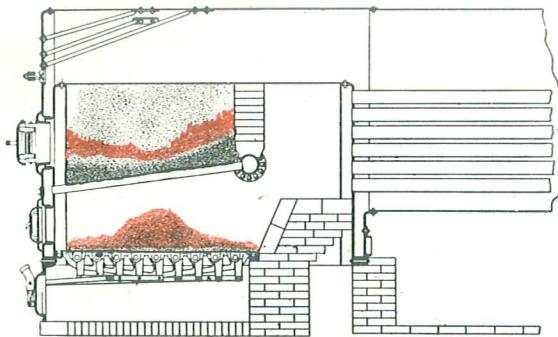


Fig. 15

Figure No. 16—In Figure No. 16 we show the improper method of using a poker in this type of furnace. The poker sticking through the grate and almost touching the bottom grate, does nothing but make a hole in the fire. The end below the upper grate is floating around in space, but by bearing down on this poker you have the condition observed in the middle poker. Continuously bearing down on this same poker you will observe that it has been pulled up through the fire and is in condition shown at top. The idea of using a poker in this type of furnace is not to stir or break up the fire, but to let the ash accumulation drop on the lower grate. In a few cases with coal high in pitch and in a heating furnace you will have some caking that will make it necessary to break the fuel up slightly that air may pass through it, but it is wholly unnecessary to do it in the manner shown in this figure. The proper way is to put the point of the poker right into the fire and raise slightly to make the fuel bed porous, and drop back in this same position. In this way the accumulation of ash will not be raised up into the fire.

You will observe that the ash has not fallen through on the bottom grate, but is mixed up with the fuel on the top grate. Fresh coal put on the top produces a heavy hard clinker.

Clinker is always formed by re-fusing the ash accumulation of the previous fire. This applies to this type of furnace, and all other types of furnaces regardless of what make.

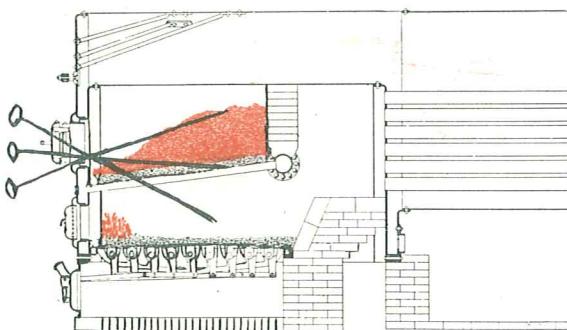


Fig. 16

Banking Fires on Down-Draft Furnaces

In every building there comes a time when fires are banked for the night, and in preparing a fire for a bank, the proper method to use is the same as though you were preparing it for a fresh supply of fuel. The following figures show the proper method of banking a fire, and also the opening of this bank the morning after.

Figure No. 17—Shows the fire banked in the proper manner. When fuel is put on in this manner, the top door is shut by disconnecting regulator. The bottom ash pit door circular openings are left open as usual, and banked in this manner, the boiler will hold steam for two or three hours in this condition, and it will not be necessary to touch this fire until the following morning.

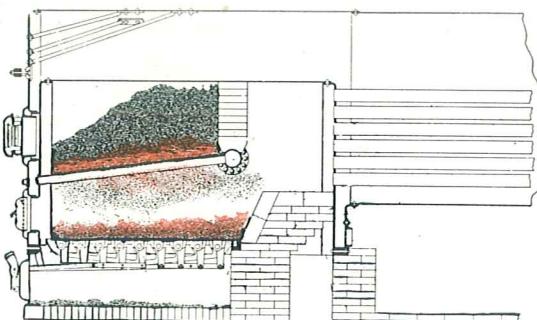


Fig. 17

Figure No. 18—Shows what you usually find the next morning when you break up the bank, and the poker should be used in the manner shown. During the night if the fire on the bottom grate is all burned, use the shaker to get this ash accumulation off the lower grate and into the ash pit. Before you have completed the operation of using the poker in this manner on the top grate, you will have steam on your entire building.

In general, you should look at the upper grate from below, looking through the middle door. If you see black spots on this under side of the upper grate, it means that there is ash or clinker. Ash or clinker make that portion of the grate they cover of no value, and if allowed to continue, spoils your fire and causes you a lot of extra work. A muddy flame between the upper and lower grates means that you are making smoke. This is due usually to ash or clinker on the upper grate, or may be due to too thick a fire for the draft that you have. Before putting on fresh fuel always clean the top grates of ash by using the poker through the top door and under the fuel bed. Keep all parts of the firing grate covered. Bare spots on the upper grate reduce the temperature of the gases and complete combustion is impossible.

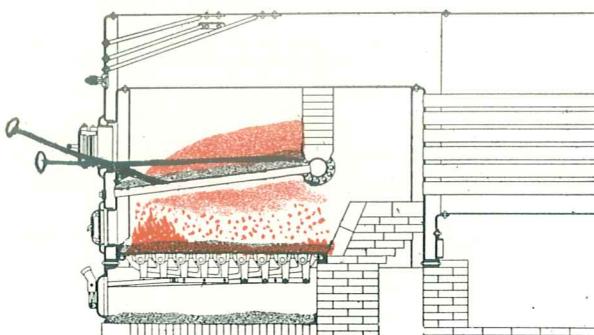


Fig. 18

When first fire is burned down and needs a fresh supply of coal, use the poker to level and straighten out the fire before supplying fresh fuel. Then supply fresh fuel to the amount you wish to carry on the water tube grate, and let it burn. See that valves at top and bottom of water gauge glass are ALWAYS OPEN.

Taking Care of the Boiler in Summer

When the boiler is to be closed down for the summer months, the manhole and the handhole plates, as well as all brass clean-out plugs, should be removed and the boiler thoroughly washed out. Scale or sediment that may have collected in the boiler should be removed. The boiler should be washed out with a stream of water from a hose, then be dried out internally as follows:

A small, lighted, single-burner kerosene stove should be placed in the firebox, leaving it there until it burns out. Never dry the boiler by building a fire upon the grate, even though very light materials are used, because there is danger of seriously damaging the boiler in this way.

Leave all manholes, handholes and all plug openings wide open so that there may be a free circulation of air through the boiler. All air valves in the radiators should be left wide open.

If the basement or boiler room is damp during the summer months covering the outside surfaces with a coat of preservative paint or mineral oil will prevent rusting.

Force a rag well saturated with mineral oil through fire tubes.

The outer surfaces of the boiler should be thoroughly cleaned and freed from soot and ash. Any rust or other deposit should be carefully removed by scraping or with a scratch brush and after being thoroughly cleaned should receive a preservative coating of oil.

The soot and ash should be removed from all parts of the setting as well as from the boiler itself. The side walls should be brushed down, the grates should be cleaned and brushed, (pay particular attention to corners of firebox and space on outer edge of grate rests and end bars), the ash

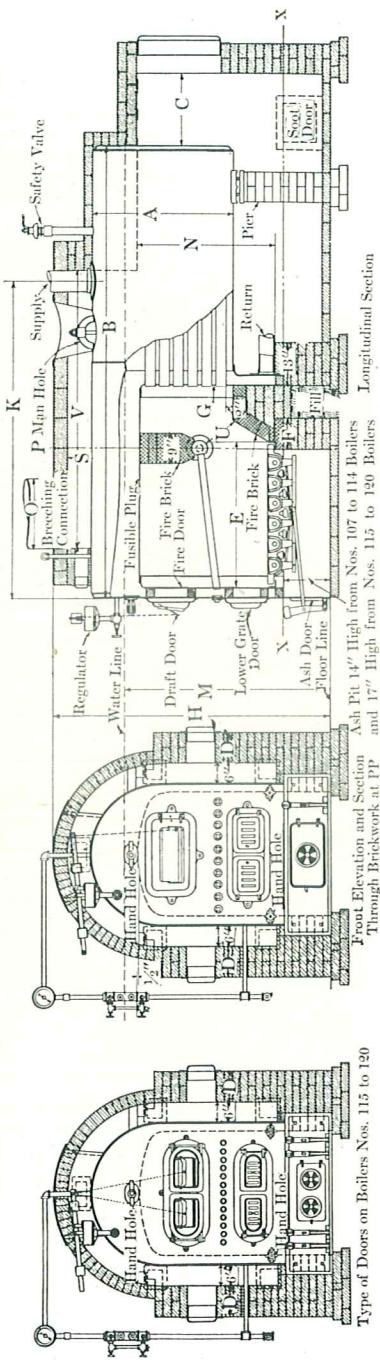
pit should be well cleaned out and the breeching leading to the chimney should be cleaned internally. No work should be spared in any of these respects.

When the boiler has been prepared as above, care should be taken to see that no water can flow through the feed valve into the boiler.

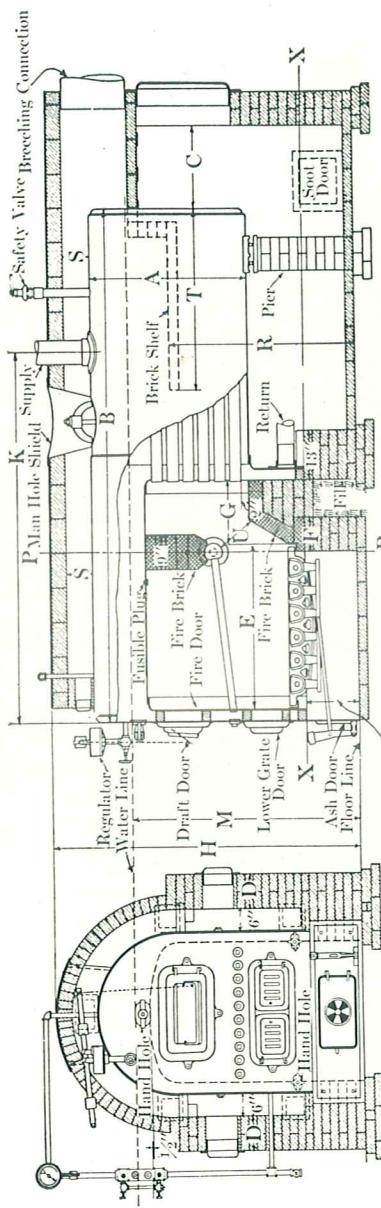
All accessories of the boiler should be looked over carefully to see that they are in good working condition and ready for use the next season. Any repairs or changes that are needed on the boiler or about the system should be made as soon as possible after the boiler is put out of service for the summer. Early attention to these points is important because the work is likely to be forgotten if it is delayed.

When starting up in the fall, fill boiler with water, wash out, and refill.

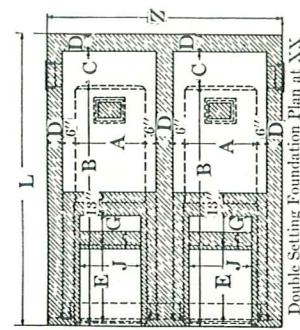
Section KEWANEE SMOKELESS BOILER—Brickset—Showing Setting with Stack Connection at Front



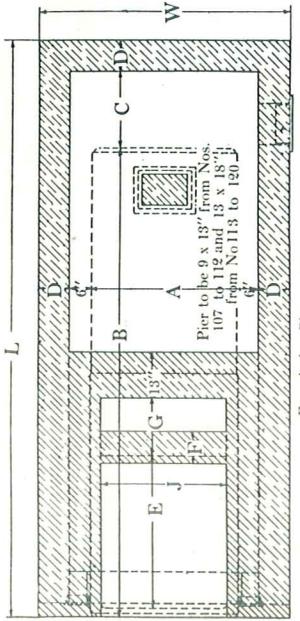
Section KEWANEE SMOKELESS BOILER—Brickset—Showing Setting with Stack Connection at Rear



Front Elevation and Section Ash Pit 14" High from Nos. 107 to 114 Boilers 1 Through Brickwork at PP and 17" High from Nos. 115 to 120 Boilers



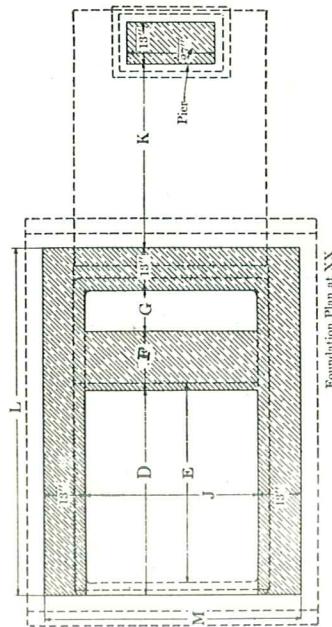
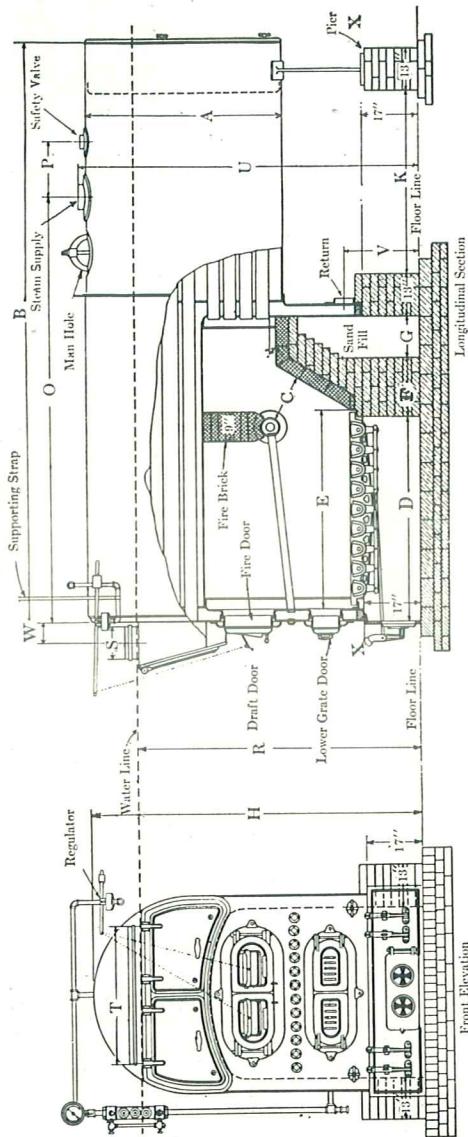
Double Setting Foundation Plan at XX



Foundation Plan at XX

Number of Boiler.	108	109	110	111	112	113	114	115	116	117	118	119	120
A—Diameter of Boiler	42	42	48	48	48	54	54	60	60	66	66	72	72
B—Length Boiler	9-10	11-4	12-10	12-4	13-10	15-4	15-9	18-3	17-10	20-4	18-4	20-4	20-4
C—Rear Space	22	22	22	22	22	24	24	24	24	24	24	28	28
D—Thickness Wall	9	9	9	9	9	13	13	13	13	13	13	13	13
E—Length Grate	43	43	49	49	55	55	61	61	67	67	67	73	73
F—Width Ash Pit	37	37	43	43	43	49	49	54	54	60	60	66	66
G—Thickness Bridge Wall	9	9	13	13	13	18	18	18	18	18	18	18	18
H—Header to Tube Sheet	17	17	23	23	23	23	23	23	23	29	29	29	29
I—Header to Bridge Wall	9	10	12	10	11	13	14	14	14	14	14	16	17
J—Height Brickwork	83	83	90	90	96	96	108	108	114	114	120	120	120
K—Location Steam Supply	8-0	8-0	9-0	9-0	10-4	11-0	11-6	11-0	12-0	12-0	12-0	12-0	12-0
L—Length over-all	13-5	14-11	16-5	17-11	18-10	21-4	21-4	21-4	21-5	21-5	21-5	21-5	21-5
M—Height Water Line	58 _{1/2}	61 _{1/2}	61 _{1/2}	61 _{1/2}	66	66	75	75	80	80	85 _{1/2}	85 _{1/2}	85 _{1/2}
N—Height Side Flue	39	39	42	42	42	48	48	51	51	58	58	63	63
O—Diameter Breeching Connection	22	22	24	24	27	30	30	34	34	36	36	38	38
P—Height Brick Shelf	50	50	53	53	53	56	56	63	63	66	66	69	69
Q—Top Flue Space	7	7	8	8	8	10	10	10	10	10	10	10	10
R—Length Brick Shelf	48	60	54	66	80	84	102	90	108	84	102	102	102
S—Length of Arch	7-0	7-6	8-0	8-1	9-9	10-0	10-6	10-10	11-0	11-1	11-1	12-1	12-1
T—Width Overall	6-0	6-0	6-0	6-6	6-6	7-8	7-8	8-2	8-2	8-8	8-8	9-2	9-2
U—Width Double Setting	11-3	11-3	11-3	12-3	12-3	14-3	14-3	15-3	15-3	16-3	16-3	17-3	17-3
*Number Common Brick	2600	2850	3100	3700	4000	6000	6600	7350	7900	8300	8700	9300	9300
Number Fire Brick	100	100	130	130	130	155	155	215	215	250	250	310	310
*Common Brick for Two Boilers	4500	4950	5350	6500	7000	7550	10500	11500	12150	13100	14200	15000	16000

*Foundations not included.
Key Letters N and V apply only to Boiler Settings with Breeching Connection at Front. Key Letters R and T apply only to Boiler Settings with Breeching Connection at Rear.



Section KEWANEE SMOKELESS BOILER
Showing Portable Type Setting
Plan and Foundation

*Iron Ash Pit furnished with Boilers 307, 308, and
 309. All others set on brick foundation
 as shown above.*

Boilers Numbers 307, 308, 309, 310,
 311, 312, 313, and 314 are constructed
 with bell top.

Foundation Plan at XX

Setting Measurements KEWANEE SMOKELESS Boiler-Portable Type

Number of Boiler	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322
A—Diameter Boiler in.	48	48	48	54	54	54	54	54	60	60	66	66	72	72	78	78
B—Length Boiler ft. in.	9-1	10-5	11-5	10-11	11-11	12-11	12-11	12-11	13-11	15-3	15-9	17-9	16-7	17-11	17-10	18-10
E—Length Grate in.	37	43	49	49	55	61	55	61	61	67	61	67	67	73	73	73
C—Header to Bridge Wall in.	9	10	11½	11½	14	14	12½	14	14	15	15	16	16	17	17	18
D—Length Ash Pit in.	38	44	50	50	56	62	56	62	63	69	63	69	69	75	75	75
F—Thickness Bridge Wall in.	9	9	9	13	13	13	13	13	13	18	18	18	18	18	18	18
G—Bridge Wall to Rear Wall in.				12	12	12	12	12	12	13	13	13	13	13	13	19
K—Ash Pit to Pier in.					29	39	45									
K—Rear Wall to Pier in.						37	37	27	33	39	45	51	57	62	80	63
J—Width Ash Pit in.						46	46	43	43	49	49	53	53	59	65	72
M—Width Foundation in.						61	67	60	60	66	66	79	79	85	91	71
L—Length Base in.								90	96	96	107	113	107	113	91	97
H—Height Boiler in.								84	84	89	89	98	101	101	107	113
U—Height Supply in.								85	85	90	90	99	103	103	109	115
V—Height of Return in.								19	19	19	19	20	20	23	23	117
R—Height Water Line in.								71	71	76	76	83	83	87	90	96
O—Location Supply ft. in.	5-11	6-8	7-3	7-6	8-2	8-9	8-9	9-3	10-11	11-6	11-0	11-9	11-7	12-2	115	115
P—Location Safety Valve in.	12	14	14	13	13	15	15	15	18	16	18	16	18	15	15	16
W—Center Breeching Connection to Front of Boiler in.	8	8	8	8	8	8	8	9½	9½	9½	9½	10½	10½	11½	11½	11½
S—Width Breeching Connection in.	10	10	10	10	10	10	10	10	10	12½	12½	12½	15	15	17	17
T—Length Breeching Connection in.	36	36	36	36	42	42	42	42	46	46	46	46	50	50	54	60
*Number Common Brick	200	200	800	825	850	1025	1050	1300	1350	1300	1350	1375	1450	1400	1475	
Number Fire Brick	115	115	155	155	195	195	210	215	240	240	255	255	290	315	315	
Outside Surface to be Covered sq. ft.	148	157	173	184	212	221	255	265	280	290	330	335	360	370	400	

*Foundations not included.

Parts of the Century Grate

